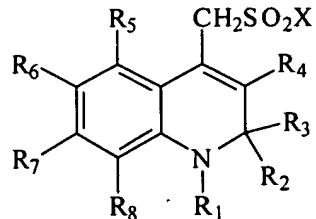
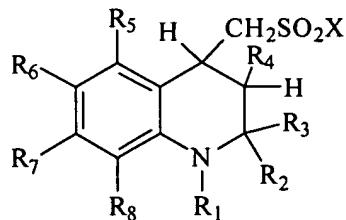


CLAIMS

1. Process for the production of dihydroquinoline compounds of the general formula Ia or of tetrahydroquinoline compounds of the general formula Ib



Ia



Ib

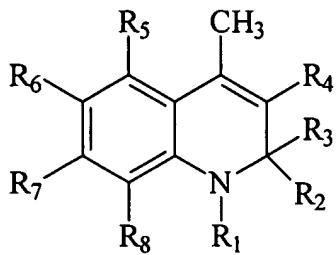
in which R₁ denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents,

R₂, R₃, R₄, R₅, R₆, R₇ and R₈ on each occurrence and independently of one another denote hydrogen, halogen, a hydroxy, amino, sulfo, carboxy or aldehyde group or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, or the residues R₁ and R₈ together form a ring system and

X denotes OH, halogen, -O-R₉, -S-R₁₀ or -NR₁₁R₁₂ where R₉, R₁₀, R₁₁ and R₁₂ independently of one another denote hydrogen or a C1 to C20 hydrocarbon residue which can optionally contain one or more heteroatoms or/and one or more substituents,

characterized in that

the corresponding compounds I'a

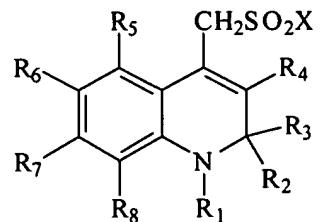


I'a

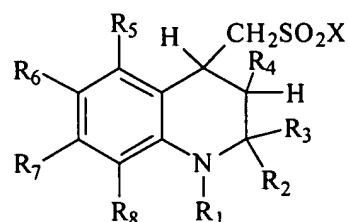
are sulfonated to form Ia (X = OH) and optionally converted by hydrogenation into Ib (X = OH).

2. Process as claimed in claim 1,
characterized in that
the sulfonation is carried out by means of concentrated sulfuric acid.
3. Process as claimed in claim 1 or 2,
characterized in that
the sulfonic acid group formed in the sulfonation is derivatized.
4. Process as claimed in claim 3,
characterized in that
the sulfonic acid group is converted into a sulfochloride.
5. Process as claimed in claim 3 or 4,
characterized in that
the sulfochloride group is reacted with a primary or secondary amine to form a sulfonamide.

6. Dihydroquinoline compound of the general formula Ia or tetrahydroquinoline compound of the general formula Ib



Ia



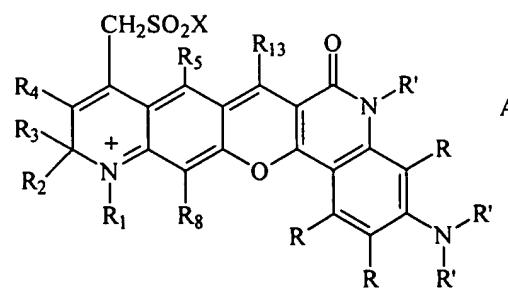
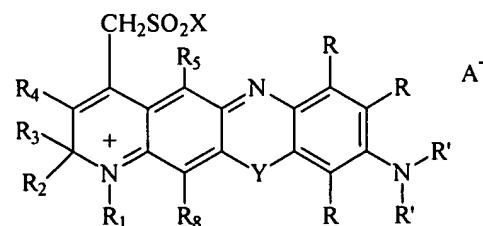
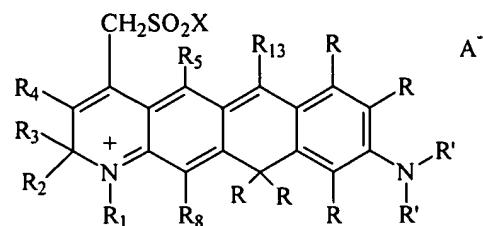
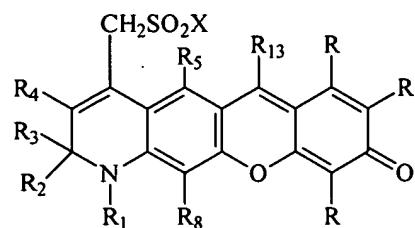
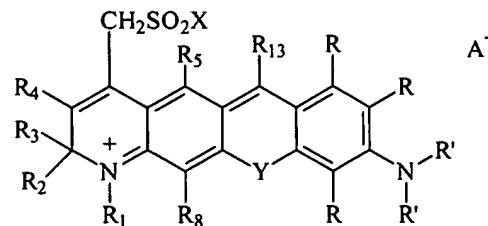
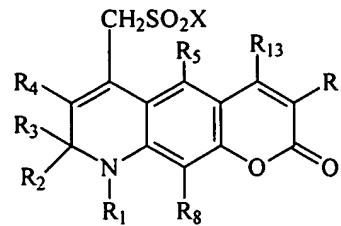
Ib

in which R₁ denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents,

R₂, R₃, R₄, R₅, R₆, R₇ and R₈ on each occurrence and independently of one another denote hydrogen, halogen, a hydroxy, amino, sulfo, carboxy or aldehyde group or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, or the residues R₁ and R₈ together form a ring system and

X denotes OH, halogen, -O-R₉, -S-R₁₀ or -NR₁₁R₁₂ where R₉, R₁₀, R₁₁ and R₁₂ each independently of one another denote hydrogen or a C1 to C20 hydrocarbon residue which can optionally contain one or more heteroatoms or/and one or more substituents, in particular -SO₃H, -PO₃H₂ and -COOH.

7. Compound as claimed in claim 6,
wherein R₁ represents an aryl or alkyl residue and in particular a C5 to C15 aryl or a C1 to C20 alkyl residue, R₂ and R₃ are methyl and R₄ denotes hydrogen.
8. Compound as claimed in claim 6 or 7,
characterized in that
R₇ represents a hydroxy or methoxy residue.
9. Process as claimed in one of the claims 6 to 8,
characterized in that
R₆ represents a nitroso group.
10. Process as claimed in one of the claims 6 to 7,
characterized in that
R₆ represents a formyl or a hydroxymethyl group.
11. Compound as claimed in one of the claims 6 to 10,
characterized in that
X denotes halogen and in particular Cl.
12. Compound as claimed in one of the claims 6 to 11,
characterized in that
X represents the residue -NR₁₁R₁₂ where the residues R₁₁ and R₁₂ are defined as in claim 6.
13. Process for the production of dyes of the general formulae II to VII containing -SO₂X



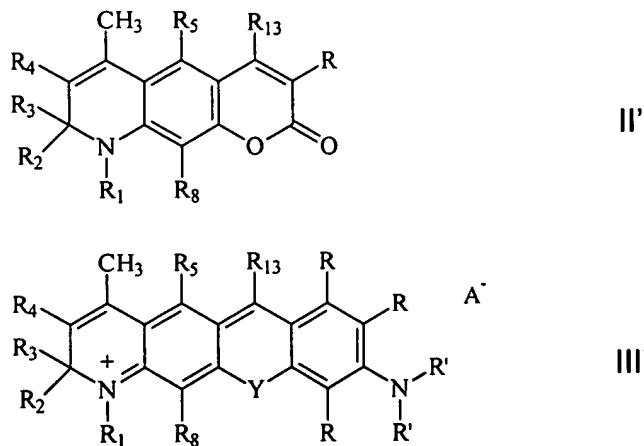
in which R₁, R₂, R₃, R₄, R₅ and R₈ are defined as in claims 1 to 12, R on each occurrence can be the same or different and is defined as for R₁, R₂, R₃, R₄, R₅ and R₈ and R' on each occurrence and independently of one another denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, or the residues R and R' together form a ring system which can contain one or more double bonds,

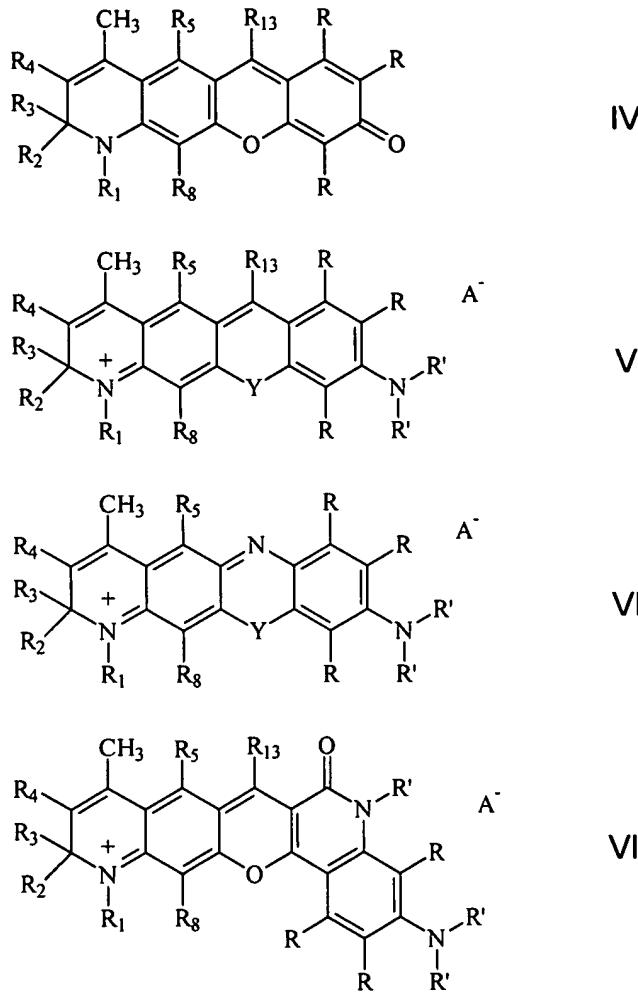
R₁₃ on each occurrence and independently of one another denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, where R₁₃ in particular represents hydrogen, aryl, carboxyphenyl, alkyl, perfluoroalkyl, cycloalkyl, pyridyl or carboxypyridyl,

X denotes OH, halogen, -O-R₉, -S-R₁₀ or -NR₁₁R₁₂ where R₉, R₁₀, R₁₁ and R₁₂ each independently of one another denote hydrogen or a C1 to C20 hydrocarbon residue which can optionally contain one or more heteroatoms or one or more substituents, and

Y in formula III denotes O, S or Se and Y in formula VI denotes O, S or C(R)₂, characterized in that

corresponding compounds of formulae II' to VII'



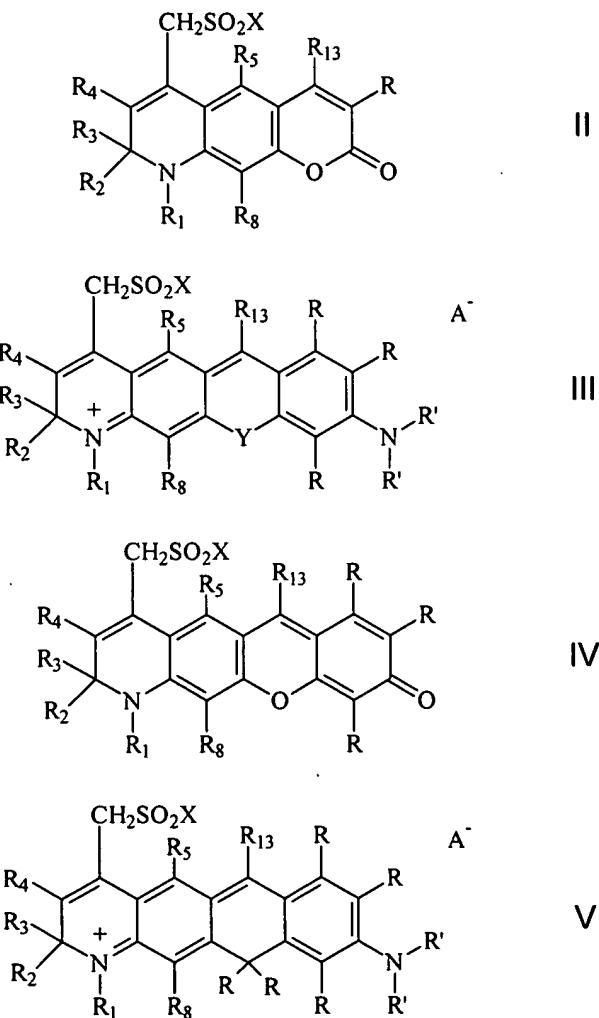


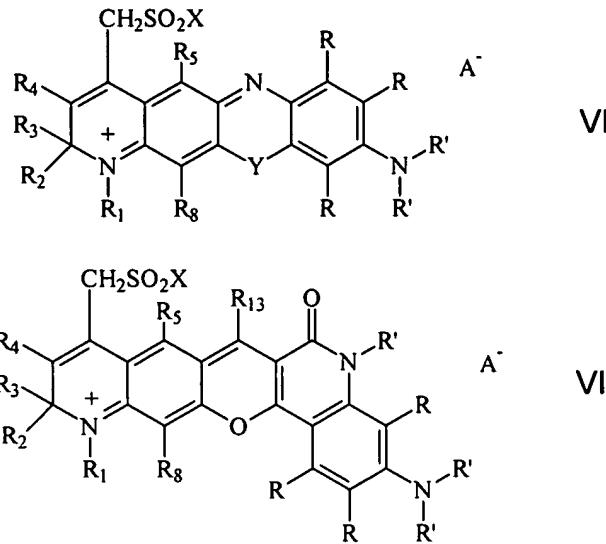
are sulfonated with the proviso that for compounds of formula III in which Y = O and for compounds of formula IV, X does not denote OH.

14. Use of a compound as claimed in one of the claims 6 to 12 or of a compound that is obtainable by the process as claimed in one of the claims 1 to 5 to produce polycyclic dyes.
15. Use as claimed in claim 14 to produce polycyclic dyes of formulae II to VII.
16. Process for the production of polycyclic dyes, characterized in that

compounds which have a dihydroquinoline end group with a 4-methyl group are sulfonated and optionally hydrogenated to form a tetrahydroquinoline with the proviso that the polycyclic dye is not a compound of formula III in which Y = O and X = OH of formula IV in which X = OH.

17. Polycyclic dye which is obtainable according to the process as claimed in one of the claims 13 to 16.
18. Polycyclic dye of the general formulae II to VII





in which

R' denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents,

R on each occurrence and independently of one another denotes hydrogen, halogen, a hydroxy, amino, sulfo, carboxy or aldehyde group or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, or the residues R' and R together form a ring system which can contain one or more multiple bonds,

R₁₃ on each occurrence and independently of one another denotes hydrogen or a hydrocarbon group with 1-20 C atoms where the hydrocarbon group can optionally contain one or more heteroatoms or/and one or more substituents, where R₁₃ in particular represents hydrogen, aryl, carboxyphenyl, alkyl, perfluoroalkyl, cycloalkyl, pyridyl or carboxypyridyl,

X denotes OH, halogen, -O-R₉, -S-R₁₀ or -NR₁₁R₁₂ where R₉, R₁₀, R₁₁ and R₁₂ each independently of one another denote hydrogen or a C1 to C20 hydrocarbon residue which can optionally contain one or more heteroatoms or one or more substituents, and

Y in formula III denotes O, S or Se and Y in formula VI denotes O, S or

C(R)₂,

with the proviso that the dye is not a compound of the general formula III in which Y = O and X = OH or of the general formula IV in which X = OH.

19. Polycyclic dye as claimed in claim 17 or 18,
characterized in that
X denotes halogen and in particular Cl.
20. Polycyclic dye as claimed in claim 17 or 18,
characterized in that
X represents the residue -NR₁₁R₁₂ where the residues R₁₁ and R₁₂ are defined as in claim 18.
21. Polycyclic dye as claimed in claim 20,
characterized in that
R₁₁ or/and R₁₂ represents an alkyl or aryl residue substituted with -COOH.
22. Use of a dye as claimed in one of the claims 17 to 21 to label an analyte.
23. Use as claimed in claim 22,
characterized in that
the analyte is a biomolecule and in particular a peptide or nucleotide.
24. Use as claimed in claim 22 or 23,
characterized in that
the labelling occurs by the dye binding to an NH₂ or SH group of the analyte.

25. Use of a dye as claimed in claim 19 to label an analyte in which the dye is bound by coupling to an amino group of the analyte.
26. Use of a dye as claimed in claim 21 to label an analyte where the dye which is for example activated as an NHS ester is bound by coupling to an amino group of the analyte.
27. Use of a dye as claimed in one of the claims 17 to 21 for coupling to another dye.
28. Use as claimed in claim 27,
characterized in that
it is coupled via an amino group of the other dye to thus form a FRET pair.